

PATENT ABSTRACTS OF JAPAN

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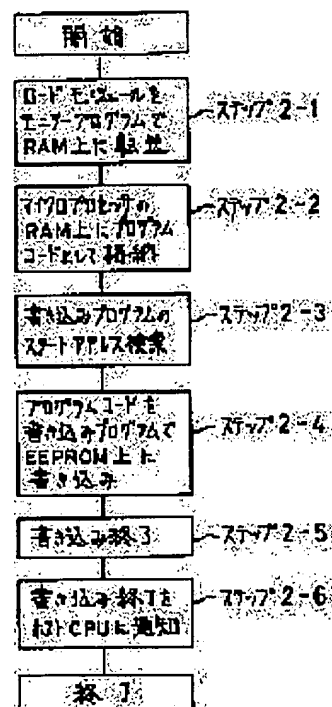
(72)Inventor : OGAWA YOSHIO

(54) MICROPROCESSOR SYSTEM

(57)Abstract:

PURPOSE: To write a load module without modifying a monitor program by transferring a merged program to a 1st RAM, starting a writing program for the transferred merged program, and writing the program data of the merged program in a 2nd memory.

CONSTITUTION: The program data except the symbol information on the load module are transferred to a RAM by the monitor program and the transferred program data are stored in a RAM A as program codes (steps 2-1 and 2-2). The writing program is executed by a host CPU at its start address retrieved from the symbol information to write the system program part of the program codes stored in the RAM in an EEPROM (steps 2-3 and 2-4). After the writing is completed, a writing end command is sent to the host CPU to report the end of the writing (steps 2-5 and 2-6).



LEGAL STATUS

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[Date of sending the examiner's decision of rejection]

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[Date of final disposal for application]

[Patent number]

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CLAIMS

[Claim(s)]

[Claim 1] The host CPU which has the file memory which stores a program, and the microprocessor which has the 1st and 2nd memory, In the microprocessor system equipped with the write-in means which transmits the program stored in the file memory of said host CPU to the 1st memory, and writes this transmitted program in the 2nd memory The coupling means which is made to combine the program for writing the program stored in the file memory of said host CPU, and the program transmitted to said 1st memory in the 2nd memory, and generates a joint program, A transfer means to transmit the joint program generated by this coupling means to said 1st memory, The microprocessor system characterized by providing the program execution means which starts the joint program transmitted to said 1st memory by this transfer means, and writes a predetermined program in the 2nd memory.

[Claim 2] The microprocessor system according to claim 1 characterized by providing the arbitration write-in means which writes pro GURAMUDE-TA of the joint program which prepared the arrangement address information of said 2nd memory in said host CPU, and was transmitted to said 1st memory based on this arrangement address information in the address of the arbitration of said 2nd memory.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to a microprocessor system.

[0002]

[Description of the Prior Art] The microprocessor is widely used for the control unit of industrial systems, such as a motor drive, a robot, and a component-mounting machine, the car information system, etc. The configuration of a microprocessor stores RAM used as program area, stack area, or a work area, and a program, and consists of a ROM from which the stereo turns into an activation medium, a peripheral LSI, etc.

[0003] Generally, a program is manufactured with a personal computer etc., is created with programming language, an assembler, etc., and stores it as files, such as a floppy disk of a personal computer, and a hard disk. This file is called a source file.

[0004] A source file is changed into the pseudo code called an object module with a compiler etc. according to the programming language used for creation. This object module contains the symbol for referring to the program and data which are defined by a relative address and other source files etc.

[0005] After creating an object module, two or more object modules are combined and conversion to the real address is performed. This actuation is called a link and location-TO, the module created by this is changed into a load module and the instruction of a call and a microprocessor, and the real address is assigned.

[0006] When building a load module into a microprocessor, a load module will be written in ROM. Generally the writing of ROM is performed using the tool of dedication. As the procedure, a load module will be transmitted to a tool and it will be written in ROM. ROM in which the load module was written is attached in the ROM mounting section of a microprocessor.

[0007] In recent years, ROM which can rewrite data electrically is beginning to be used instead of ROM which performs the conventional ultraviolet-rays elimination. This memory is called the flash memory or EEPROM (Electrically Erasable Programmable ROM: nonvolatile memory). When this memory is carried in a microprocessor as a program execution medium of a microprocessor, a program will be manufactured with a personal computer etc., and it will transmit to a microprocessor from the host CPU, and will write in EEPROM.

[0008] The principal part of the microprocessor system generally used is shown in drawing 8. RAM12 which a microprocessor 1 stores CPU11 and a system program, and serves as program execution area, a data area, stack area, and a work area in drawing 8, EEPROM13 in which a load module is written, and initialization processing of a microprocessor 1, Starting processing of the system program at the time of online and the command sent via the host CPUs I/F15 which perform the communication link with the host CPU 14 to the host CPU 14 at the time of off-line are followed. The data writing to RAM12, It consists of ROM16 in which the monitoring program which performs the writing of data read-out, the activation transition to the program stored in RAM12, and the program to EEPROM13 etc. is stored, and I/O module 17 used as an interface with a peripheral device and an I/O machine.

[0009] The host CPU 14 performs issue of the command to a microprocessor 1, storing of a load module, etc. The detail of the host CPU is shown in drawing 9. The host CPU consists of CPU21, a system memory 22 in which the system program which performs the monitoring program and communications control of a microprocessor and publishes a command is stored, file memory 23 in which the load module is stored based on file management information, and microprocessor I/F24 which is the interface section of the communication link with a microprocessor.

[0010] Drawing 10 is drawing showing the write-in procedure to EEPROM in the conventional microprocessor system. The load module stored in the file memory of the host CPU is transmitted on RAM of a microprocessor based on the instruction of the monitoring program in which it is written by ROM of a microprocessor (step 1).

[0011] The load module transmitted to RAM of a microprocessor is changed into a program code, and is stored in RAM. Since the program code stored in RAM was stored in RAM, it was only changed, and the function is the same as a load module. (Step 2)

The program code stored in RAM is written in EEPROM of a microprocessor based on the instruction of the monitoring program in which it is written by ROM of a microprocessor. (Step 3)

In the conventional microprocessor system, the transfer to RAM of the microprocessor of a load module and the writing to EEPROM are performed by the monitoring program stored in ROM of a microprocessor.

[0012]

[Problem(s) to be Solved by the Invention] However, the writing of the load module to EEPROM in the conventional microprocessor system Although it is necessary to change the monitoring program which takes charge of the writing to EEPROM when capacity increases by extension of a system etc. and the address is changed, or when the medium of EEPROM becomes what has another write-in algorithm etc. This monitoring program Initialization processing of not only the writing to EEPROM but a microprocessor, Since starting processing of the system program at the time of online, writing of the data to RAM, read-out of data, activation transition to the program stored in RAM, etc. are performed It must exchange for ROM in which it stored in again another ROM also about the thing without the need for these modification, and the load module which must change the approach to EEPROM to write in was stored.

[0013] Moreover, to change the program of a microprocessor system on the spot, it is necessary to simplify operability as much as possible, to lessen an operator error, and to raise dependability.

[0014] Therefore, in this invention, the writing of the load module to EEPROM of the load module in a microprocessor system is made easy, and it aims at offering the microprocessor system which enables the writing of a load module, without changing a monitoring program, even if a write-in environment changes.

[0015]

[Means for Solving the Problem] In the microprocessor system applied to claim 1 of this invention in order to attain the above-mentioned purpose The host CPU which has the file memory which stores a program, and the microprocessor which has the 1st and 2nd memory, In the microprocessor system equipped with the write-in means which transmits the program stored in the file memory of the above-mentioned host CPU to the 1st memory, and writes this transmitted program in the 2nd memory The coupling means which is made to combine the program for writing the program stored in the file memory of the above-mentioned host CPU, and the program transmitted to the 1st memory of the above in the 2nd memory, and generates a joint program, It is characterized by having a transfer means to transmit the joint program generated by this coupling means to the 1st memory of the above, and the program execution means which starts the joint program transmitted to the 1st memory of the above by this transfer means, and writes a predetermined program in the 2nd memory.

[0016] In the microprocessor system concerning claim 2 of this invention, the arrangement address information of said 2nd memory is prepared in said host CPU, and it is characterized by having the arbitration write-in means which writes pro GURAMUDE-TA of the joint program transmitted to said 1st memory based on this arrangement address information in the address of the arbitration of said 2nd memory.

[0017]

[Function] The joint program which combined the program stored in the file memory of the host CPU and the program which writes the program transmitted to the 1st memory in the 2nd memory in the microprocessor system concerning claim 1 of this invention transmits to the 1st RAM of a microprocessor, the write-in program of the transmitted joint program starts, and pro GURAMUDE-TA of a joint program writes in to the 2nd memory.

[0018] The joint program which combined the program stored in the file memory of the host CPU and the program which writes the program transmitted to the 1st memory in the 2nd memory is transmitted to the 1st RAM of a microprocessor, and it writes in the address of the arbitration of the 2nd memory in the microprocessor system concerning claim 2 of this invention based on the arrangement address information of the 2nd memory in which pro GURAMUDE-TA of a joint program was prepared by the host CPU.

[0019]

[Example] The 1st example of this invention is explained using a drawing. Drawing 1 is drawing having shown the procedure of the writing to EEPROM of this invention. Pro GURAMUDE-TA except the symbol information on a load module is transmitted on RAM of a microprocessor system with a monitoring program (step 2-1).

[0020] Transmitted pro GURAMUDE-TA is stored in RAM of a microprocessor as a program code (step 2-2). A function is the same as pro GURAMUDE-TA only by being changed since the program code stored in RAM is stored in RAM.

[0021] It writes in from the symbol information on a load module, and the start address of a program is searched (step 2-3). It searches and writes in by the start address, and a program is performed from the host CPU, the system program section of the program code stored in RAM is written in, and it writes in EEPROM according to a sequence (step 2-4).

[0022] Termination of the writing to EEPROM notifies that delivery and writing ended the command of write-in termination to the host CPU (step 2-5). A storing **** load module becomes the file memory of the host CPU from the symbol information 27 which stores the address information on the program of the symbol and symbol which pro GURAMUDE-TA 26 with the information which shows the storing address of pro GURAMUDE-TA and a program as shown at drawing 2 , and pro GURAMUDE-TA have.

[0023] Moreover, this pro GURAMUDE-TA 26 consists of a system program 31 which performs a microprocessor as shown in drawing 3 , and a write-in program 32 to EEPROM.

[0024] When it becomes what has write-in algorithm with the another medium of EEPROM etc. when capacity increases by extension of a system etc. and the address is changed by this, the writing to EEPROM comes be made only in modification of a write-in program like the former, without changing all monitoring programs.

[0025] Other examples of this invention are explained. First, the write-in procedure of the 2nd example of this invention is shown in drawing 4 . In the 2nd example of this invention, the system program section of the program code which prepares the arrangement address information of EEPROM in the host CPU in the write-in procedure in the 1st example, and is stored in RAM of a microprocessor based on this information is written in EEPROM arranged in the address space of arbitration. (Step 3-3) .

[0026] A program can be written in a specific address space by this, and effectiveness is demonstrated to the program which needs the address number of *Perilla frutescens* (L.) Britton var. *crispa* (Thunb.) Decne. for the actuation on ROM as a premise.

[0027] The address of EEPROM3 drawing 5 by being drawing having shown this example and preparing the arrangement address information of EEPROM1-EEPROM3 in the host CPU to store a system program PROG3 in EEPROM3 If 20000 shows starting, PROG3 can be stored from the start address of EEPROM3, or can be stored in the address of arbitration.

[0028] Moreover, the write-in procedure of the 3rd example of this invention is shown in drawing 6 . In the 3rd example of this invention, the procedure (step 4-3) which writes the file management information on the load module which the host CPU manages in the system program section of the program code stored in the write-in procedure in the 1st example at RAM of a microprocessor is added.

[0029] Coincidence detection with the system program written in EEPROM and a load module is made easy by this, and hysteresis management is attained. Furthermore, the write-in procedure of the 4th example of this invention is shown in drawing 7 . In the 4th example of this invention, the creation information of the link generated in the load module which the host CPU manages in the system program section of pro GURAMUDE-TA stored in RAM of a microprocessor in the write-in procedure in the 1st example, a rocket, etc. is extracted (step 5-3), and the procedure (step 5-4) which writes in the creation information is added. Thereby, the creation information of the system program written in EEPROM can be checked easily.

[0030]

[Effect of the Invention] The writing of a program is attained without changing a monitoring program, even if it makes easy the writing of the program to ROM eliminable electric in this invention and a write-in environment changes by the above.

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TECHNICAL FIELD

[Industrial Application] This invention relates to a microprocessor system.

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PRIOR ART

[Description of the Prior Art] The microprocessor is widely used for the control unit of industrial systems, such as a motor drive, a robot, and a component-mounting machine, the car information system, etc. The configuration of a microprocessor stores RAM used as program GURAMUDE-TAERIA, stack area, or a work area, and a program, and consists of a ROM from which the stereo turns into an activation medium, a peripheral LSI, etc.

[0003] Generally, a program is manufactured with a personal computer etc., is created with programming language, an assembler, etc., and stores it as files, such as a floppy disk of a personal computer, and a hard disk. This file is called a source file.

[0004] A source file is changed into the pseudo code called an object module with a compiler etc. according to the programming language used for creation. This object module contains the symbol for referring to the program and data which are defined by a relative address and other source files etc.

[0005] After creating an object module, two or more object modules are combined and conversion to the real address is performed. This actuation is called a link and location-TO, the module created by this is changed into a load module and the instruction of a call and a microprocessor, and the real address is assigned.

[0006] When building a load module into a microprocessor, a load module will be written in ROM. Generally the writing of ROM is performed using the tool of dedication. As the procedure, a load module will be transmitted to a tool and it will be written in ROM. ROM in which the load module was written is attached in the ROM mounting section of a microprocessor.

[0007] In recent years, ROM which can rewrite data electrically is beginning to be used instead of ROM which performs the conventional ultraviolet-rays elimination. This memory is called the flash memory or EEPROM (Electrically Erasable Programmable ROM: nonvolatile memory). When this memory is carried in a microprocessor as a program execution medium of a microprocessor, a program will be manufactured with a personal computer etc., and it will transmit to a microprocessor from the host CPU, and will write in EEPROM.

[0008] The principal part of the microprocessor system generally used is shown in drawing 8. RAM12 which a microprocessor 1 stores CPU11 and a system program, and serves as program execution area, a data area, stack area, and a work area in drawing 8, EEPROM13 in which a load module is written, and initialization processing of a microprocessor 1, Starting processing of the system program at the time of online and the command sent via the host CPUs I/F15 which perform the communication link with the host CPU 14 to the host CPU 14 at the time of off-line are followed. The data writing to RAM12, It consists of ROM16 in which the monitoring program which performs the writing of data read-out, the activation transition to the program stored in RAM12, and the program to EEPROM13 etc. is stored, and I/O module 17 used as an interface with a peripheral device and an I/O machine.

[0009] The host CPU 14 performs issue of the command to a microprocessor 1, storing of a load module, etc. The detail of the host CPU is shown in drawing 9. The host CPU consists of CPU21, a system memory 22 in which the system program which performs the monitoring program and communications control of a microprocessor and publishes a command is stored, file memory 23 in which the load module is stored based on file management information, and microprocessor I/F24 which is the interface section of the communication link with a microprocessor.

[0010] Drawing 10 is drawing showing the write-in procedure to EEPROM in the conventional microprocessor system. The load module stored in the file memory of the host CPU is transmitted on RAM of a microprocessor based on the instruction of the monitoring program in which it is written by ROM of a microprocessor (step 1).

[0011] The load module transmitted to RAM of a microprocessor is changed into a program code, and is stored in RAM. Since the program code stored in RAM was stored in RAM, it was only changed, and the function is the same as a load module. (Step 2)

The program code stored in RAM is written in EEPROM of a microprocessor based on the instruction of the monitoring program in which it is written by ROM of a microprocessor. (Step 3)

In the conventional microprocessor system, the transfer to RAM of the microprocessor of a load module and the writing to EEPROM are performed by the monitoring program stored in ROM of a microprocessor.

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EFFECT OF THE INVENTION

[Effect of the Invention] The writing of a program is attained without changing a monitoring program, even if it makes easy the writing of the program to ROM eliminable electric in this invention and a write-in environment changes by the above.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, the writing of the load module to EEPROM in the conventional microprocessor system Although it is necessary to change the monitoring program which takes charge of the writing to EEPROM when capacity increases by extension of a system etc. and the address is changed, or when the medium of EEPROM becomes what has another write-in algorithm etc. This monitoring program Initialization processing of not only the writing to EEPROM but a microprocessor, Since starting processing of the system program at the time of online, writing of the data to RAM, read-out of data, activation transition to the program stored in RAM, etc. are performed It must exchange for ROM in which it stored in again another ROM also about the thing without the need for these modification, and the load module which must change the approach to EEPROM to write in was stored.

[0013] Moreover, to change the program of a microprocessor system on the spot, it is necessary to simplify operability as much as possible, to lessen an operator error, and to raise dependability.

[0014] Therefore, in this invention, the writing of the load module to EEPROM of the load module in a microprocessor system is made easy, and it aims at offering the microprocessor system which enables the writing of a load module, without changing a monitoring program, even if a write-in environment changes.

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MEANS

[Means for Solving the Problem] This invention transmits the host CPU which has the file memory which stores a program in the microprocessor system which applies to claim 1 of this invention in order to attain the above-mentioned purpose, the microprocessor which have the 1st and 2nd memory, and the program which were stored in the file memory of the above-mentioned host CPU to the 1st memory, and carries out that the microprocessor system equipped with the write-in means which writes this transmitted program in the 2nd memory possesses the following as the description. The coupling means which is made to combine the program for writing the program stored in the file memory of the above-mentioned host CPU, and the program transmitted to the 1st memory of the above in the 2nd memory, and generates a joint program A transfer means to transmit the joint program generated by this coupling means to the 1st memory of the above The program execution means which starts the joint program transmitted to the 1st memory of the above by this transfer means, and writes a predetermined program in the 2nd memory

[0016] In the microprocessor system concerning claim 2 of this invention, the arrangement address information of said 2nd memory is prepared in said host CPU, and it is characterized by having the arbitration write-in means which writes program GURAMUDE-TA of the joint program transmitted to said 1st memory based on this arrangement address information in the address of the arbitration of said 2nd memory.

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OPERATION

[Function] The joint program which combined the program stored in the file memory of the host CPU and the program which writes the program transmitted to the 1st memory in the 2nd memory in the microprocessor system concerning claim 1 of this invention transmits to the 1st RAM of a microprocessor, the write-in program of the transmitted joint program starts, and pro GURAMUDE-TA of a joint program writes in to the 2nd memory.

[0018] The joint program which combined the program stored in the file memory of the host CPU and the program which writes the program transmitted to the 1st memory in the 2nd memory is transmitted to the 1st RAM of a microprocessor, and it writes in the address of the arbitration of the 2nd memory in the microprocessor system concerning claim 2 of this invention based on the arrangement address information of the 2nd memory in which pro GURAMUDE-TA of a joint program was prepared by the host CPU.

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EXAMPLE

[Example] The 1st example of this invention is explained using a drawing. Drawing 1 is drawing having shown the procedure of the writing to EEPROM of this invention. Pro GURAMUDE-TA except the symbol information on a load module is transmitted on RAM of a microprocessor system with a monitoring program (step 2-1).

[0020] Transmitted pro GURAMUDE-TA is stored in RAM of a microprocessor as a program code (step 2-2). A function is the same as pro GURAMUDE-TA only by being changed since the program code stored in RAM is stored in RAM.

[0021] It writes in from the symbol information on a load module, and the start address of a program is searched (step 2-3). It searches and writes in by the start address, and a program is performed from the host CPU, the system program section of the program code stored in RAM is written in, and it writes in EEPROM according to a sequence (step 2-4).

[0022] Termination of the writing to EEPROM notifies that delivery and writing ended the command of write-in termination to the host CPU (step 2-5). A storing **** load module becomes the file memory of the host CPU from the symbol information 27 which stores the address information on the program of the symbol and symbol which pro GURAMUDE-TA 26 with the information which shows the storing address of pro GURAMUDE-TA and a program as shown at drawing 2, and pro GURAMUDE-TA have.

[0023] Moreover, this pro GURAMUDE-TA 26 consists of a system program 31 which performs a microprocessor as shown in drawing 3, and a write-in program 32 to EEPROM.

[0024] When it becomes what has write-in algorithm with the another medium of EEPROM etc. when capacity increases by extension of a system etc. and the address is changed by this, the writing to EEPROM comes be made only in modification of a write-in program like the former, without changing all monitoring programs.

[0025] Other examples of this invention are explained. First, the write-in procedure of the 2nd example of this invention is shown in drawing 4. In the 2nd example of this invention, the system program section of the program code which prepares the arrangement address information of EEPROM in the host CPU in the write-in procedure in the 1st example, and is stored in RAM of a microprocessor based on this information is written in EEPROM arranged in the address space of arbitration. (Step 3-3).

[0026] A program can be written in a specific address space by this, and effectiveness is demonstrated to the program which needs the address number of *Perilla frutescens* (L.) Britton var. *crispa* (Thunb.) Decne. for the actuation on ROM as a premise.

[0027] The address of EEPROM3 drawing 5 by being drawing having shown this example and preparing the arrangement address information of EEPROM1-EEPROM3 in the host CPU to store a system program PROG3 in EEPROM3 If 20000 shows starting, PROG3 can be stored from the start address of EEPROM3, or can be stored in the address of arbitration.

[0028] Moreover, the write-in procedure of the 3rd example of this invention is shown in drawing 6. In the 3rd example of this invention, the procedure (step 4-3) which writes the file management information on the load module which the host CPU manages in the system program section of the program code stored in the write-in procedure in the 1st example at RAM of a microprocessor is added.

[0029] Coincidence detection with the system program written in EEPROM and a load module is made easy by this, and hysteresis management is attained. Furthermore, the write-in procedure of the 4th example of this invention is shown in drawing 7. In the 4th example of this invention, the creation information of the link generated in the load module which the host CPU manages in the system program section of pro GURAMUDE-TA stored in RAM of a microprocessor in the write-in procedure in the 1st example, a rocket, etc. is extracted (step 5-3), and the procedure (step 5-4) which writes in the creation information is added. Thereby, the creation information of the system program written in EEPROM can be checked easily.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

- [Drawing 1] Drawing showing the write-in procedure of the 1st example of this invention
[Drawing 2] The block diagram of the load module of this invention
[Drawing 3] Detail drawing of pro GURAMUDE-TA of the load module of this invention
[Drawing 4] Drawing showing the write-in procedure of the 2nd example of this invention
[Drawing 5] Drawing showing the writing of the 2nd example of this invention
[Drawing 6] Drawing showing the write-in procedure of the 3rd example of this invention
[Drawing 7] Drawing showing the write-in procedure of the 4th example of this invention
[Drawing 8] The main Fig. of a microprocessor system
[Drawing 9] Detail drawing of the host CPU
[Drawing 10] Drawing showing the conventional write-in procedure

[Description of Notations]

- 1 -- Microprocessor
12 -- RAM
13 -- EEPROM
16 -- ROM
23 -- File memory
25 -- Load module
26 -- Pro GURAMUDE-TA
31 -- System program
32 -- Write-in program

[Translation done.]

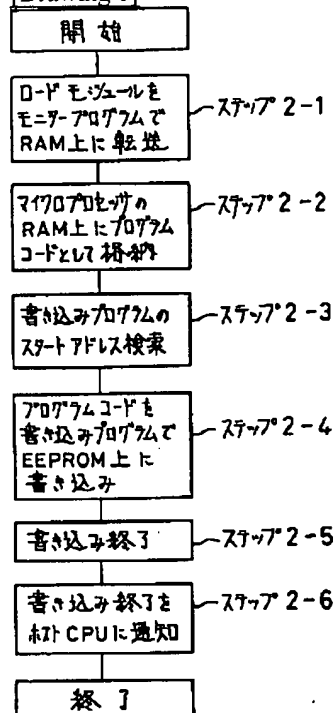
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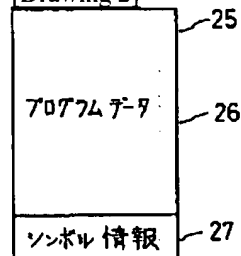
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DRAWINGS

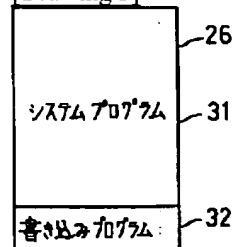
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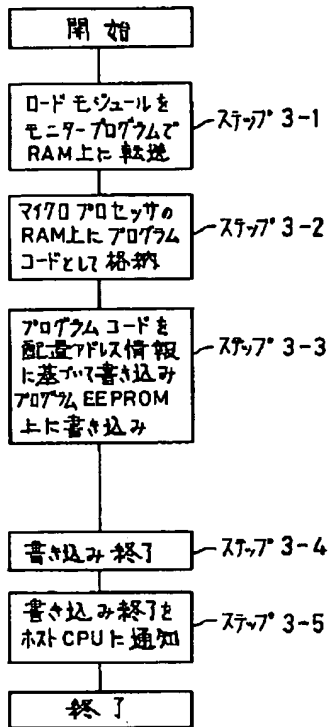
[Drawing 2]



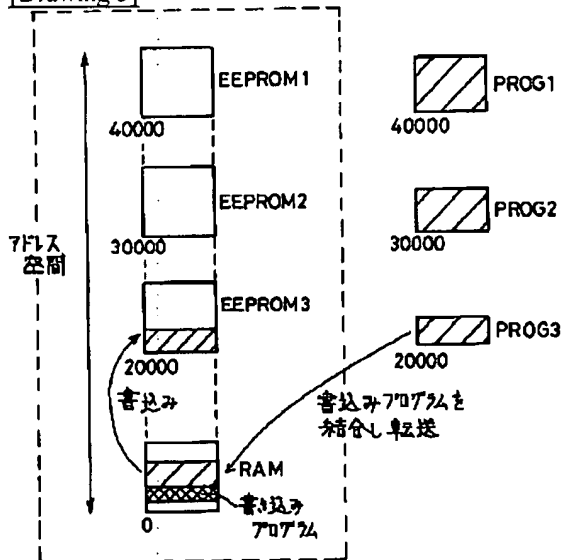
[Drawing 3]



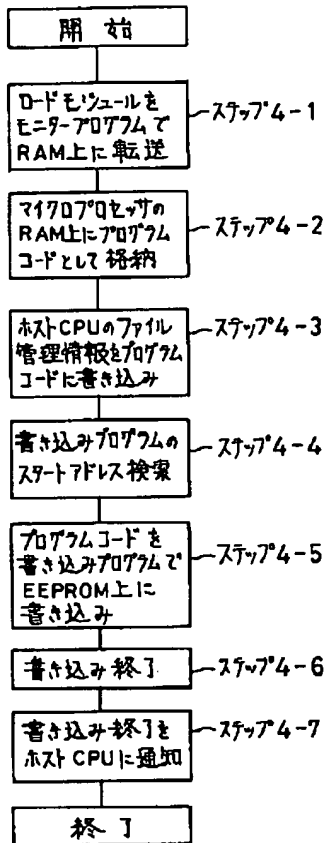
[Drawing 4]



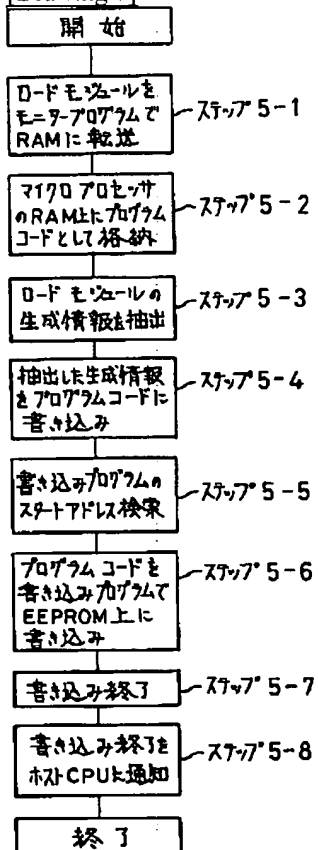
[Drawing 5]



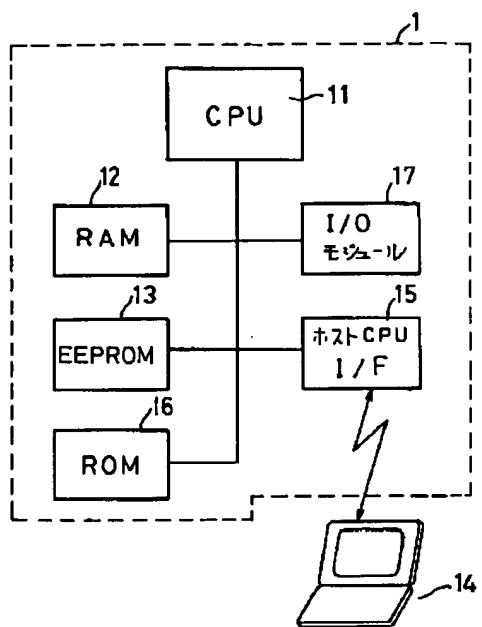
[Drawing 6]



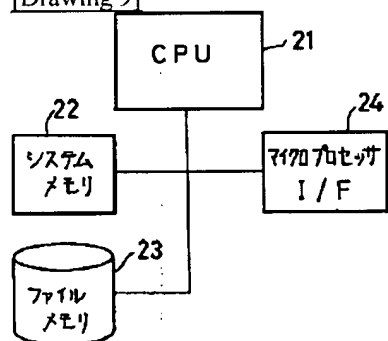
[Drawing 7]



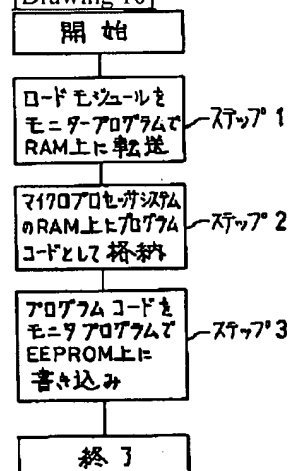
[Drawing 8]



[Drawing 9]



[Drawing 10]



[Translation done.]